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ABSTRACT

The curriculum matrix is a tool to help curriculum coordinators, principals, and superintendents specify, justify, and align curriculum and instructional time to district specified standards. The problem the curriculum matrix solves is connecting the curriculum; that is, tracing an idea from initial justification to its placement in the curriculum and to the time allotments and activities used to instruct children. Six basic tasks of curriculum development are described, and uses of the curriculum matrix are suggested for the last four tasks (the first two to be accomplished prior to the use of the matrix): (1) describing existing instruction; (2) constructing district standards for subject areas; (3) aligning and modifying instructional descriptions to meet district standards; (4) managing and assessing instructional units; (5) updating and refining curricula; and (6) deducing the district's philosophy of education. Sample instrumentation is included in the appendix: a content outline for reading/language arts, a set of objectives indexed by content area, and an enumerated list of reading/language arts objectives for grade 1, all from Red Bank (New Jersey) Public Schools, where the curriculum matrix has been successfully implemented. (TE)

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THE CURRICULUM MATRIX

A Management System for Mastery Learning

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November 19, 1984

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This paper was originally presented at the 1983 Annual Conference of the Association of Supervision and Curriculum Development in Houston, Texas. The paper has been rewritten and updated since then.

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David A. Squires

November 19, 1984

The Curriculum Matrix

A Management System for Mastery Learning

by

David A. Squires

Four curricula exist. (No, not Reading, Math, Social Studies and Science). The four curricula are:

1. The curriculum that is actually implemented in the classroom,
2. The curriculum that the teachers report they are teaching,
3. The curriculum that adminstration thinks is being taught,
4. The curriculum that is written.

The paper provides a framework for making those four curricula congruent; for molding the different points of view into one realistic, observable, attainable and defendable program.

The curriculum matrix is a tool to help curriculum coordinators, principals and superintendents specify, justify and align curriculum and instructional time to district specified standards. The problem the curriculum matrix solves is connecting the curriculum, that is, tracing an idea from initial justification to its placement in the curriculum and to the amount of time and list of activities used to instruct children. For example, in most first and second grade classrooms, several units in phonics are specified as part of the curriculum. Such units guide teachers' allocation of classroom time and instruction. The phonics units exist because research and the best of instructional practice justifies that skill in decoding, especially during the early phases of reading, will assist children in becoming

fluent readers. These units are further justified by subject area, in that learning to read is a valuable skill, and further justified by the philosophy and goals of a school district in that reading is necessary for further learning, for becoming educated, for seeking employment, and for developing personally.

The curriculum matrix is useful for accomplishing the basic tasks of any curriculum development process:

1. Describing existing instruction
2. Constructing district standards for subject areas
3. Aligning and modifying instructional descriptions in order to meet District Standards (the curriculum matrix will help here)
4. Managing and assessing instructional units (the curriculum matrix provides a framework for these processes)
5. Updating and refining curricula (the curriculum matrix ensures a balanced curriculum)
6. Deducing the District's Philosophy of Education (the curriculum matrix promotes alignment between the instructional program, the curriculum, and a district's general goals and philosophy.

I will describe the six basic tasks of curriculum development and suggest some ways that the curriculum matrix can be used in these tasks.

Describing Existing Instruction The first task of curriculum development, describing instruction, should take place before the curriculum matrix can be used. Teachers, by subject area, describe each unit of instruction; defined as instruction which takes place

between major tests. Generally there are between 10 and 25 units of instruction for each subject area at each grade level, with more units typically associated with lower grade levels. Staff describes each unit of instruction by giving the unit a title, such as "America After the Civil War" or "Three Digit Subtraction with Carrying". To further describe each unit, the staff would list three to five objectives students would master. Department chairpersons on the secondary level coordinated by the assistant principals for curriculum and instruction, and/or subject area supervisors, could assist with organizing and collating the instructional descriptions and with providing the necessary technical assistance needed to generate high quality unit descriptions. For schools with self contained classrooms, grade level leaders might provide coordination. Such descriptions can be assembled in one year's time in conjunction with weekly lesson plans. After a year each teacher would have units and objectives of the instruction actually provided to students in their classrooms. The curriculum, <u>as it is taught</u> , will have been described. The instructional description is time based, as the units are constructed around major tests.

<u>Constructing District Standards for Subject Areas</u> Concurrently with describing units of instruction, subject area committees would construct district standards for a particular subject area. District standards include specifying appropriate content and approaches for instruction and justifying their inclusion in the curriculum. In Red Bank, for example, the Reading/Language Arts Curriculum Committee proposed seven different content areas: Reading; Literature; Writing; Listening and Speaking; Rhetoric, Logic and Thinking Skills; Media Production and Analysis; and Study Skills. We believe that these areas

should be included in any "good" Reading/Language Arts curricula. Then the committee wrote a rationale for the seven areas giving reasons why students should spend time learning about this subject. In the rationale, the committee cited research which suggested effective approaches to instruction. For example, the committee suggested a "process approach" for writing based on recent research in the teaching and learning of writing skills.

When specifying standards for instruction, the committee will consider other sources which shape the curriculum. Inclusion of key concepts tested in the standardized testing program makes certain students have the opportunity to master what is tested. State requirements and tests provide another point from which to triangulate the curriculum. Professional associations offer a variety of publications which make recommendations as to important concepts and skills students need to know. Recent commission recommendations, although not in complete agreement with each other, provide many recommendations for justifying district standards. Texts provide another resource for forming the District Standards. Community values also impact on district standards. Naturally, there will be disagreements among these "expert" sources. However, the local school district must be responsible for making the tough choices and justifying their choices to the public.

Subject area experts, such as "master" teachers, subject area supervisors, and department chairpersons staffed the committees for designing subject area standards. Each subject area committee, in my opinion, should also include one principal and an assistant in order

for them to become familiar with the process, and to understand the District Standards, in detail, for one subject area. The principal will ultimately be responsible for assisting teachers in reaching unit objectives. Standards for all subject areas could be developed in approximately one year's time providing the district had budgeted for released time or summer work. To illustrate what a rationale is and how such a rationale controls instruction, a quote from the Red Bank Reading/Language Arts Rationale which concerns "Usage and Mechanics" is provided. The quote defines the place of grammar study within the Reading/Language Arts program.

> Usage and Mechanics Correct usage and mechanics enhance clear written communication. Students are taught how to translate spoken language into written language. Thus, rules for punctuation, capitalization, contractions, subject-verb agreement, comparative and superlative forms of adjectives, elimination of double negatives, and parallel construction are appropriate content in this area.
>
> Research has shown that "teaching of parts of speech does not significantly improve the quality of syntactic structure of the sentences of the elementary student. Furthermore, it takes time away form the teaching of composition skills" (Bateman & Zidonis, 1964; also Braddock, 1963; Meckel, 1963). Thus, the teaching of the parts of speech is only necessary to the extent that it fosters communication between teacher and student. Research does point to the use of sentence combining exercises as one way to significantly improve the quality of compositions (Christiansen, 1968). Sentence combining involves combining shorter sentences into longer sentences, thus helping the students express their thoughts in more complex and mature form. Such exercises also improve students' editing skills and sensitivity to different ways ideas can be expressed.

This paragraph has implications for the number of units and the amount of time spent on teaching writing versus teaching students to identify parts of speech. This paragraph set the district standard for maintaining curricular balance, favoring time and instruction in writing above teaching parts of speech.

The next step is to summarize the content areas justified in the rationale, into a content outline, which then becomes the first dimension of the curriculum matrix. For the area of writing, the content outline is enclosed. Notice the match between the justification of Usage and Mechanics and its inclusion in the content outline.

III. Writing
- A. The Writing Process
  - 1. Prewriting
  - 2. Outlining
  - 3. Writing down
  - 4. Editing
  - 5. Publishing
- B. Writing Content and Form
  - 1. Content
    - a. Short stories
    - b. Poems
    - c. Essays
    - d. Novels
    - e. Other Media
  - 2. Form
    - a. Spelling
    - b. Usage and Mechanics
    - c. Handwriting

The content outline in Reading/Language Arts is two pages, single spaced in length and provides all professional staff, and board members too, with a short form of the rationale. (The complete content outline is attached in Appendix A.)

Aligning and Modifying Curriculum Descriptions in Order to Meet District Standards At the end of the first two tasks, there would be a description of the instructional units and objectives in the district, and a set of District Standards with a shortened version in the form of a content outline.

The curriculum matrix sorts unit objectives against the content outline.

Partial Curriculum Matrix Reading/Language Arts

	Grade 1 Units/ Objectives	Grade 2 Units Objectives
I. Reading	an obj. concerning reading for first	an objective concerning reading for second grade
II. Literature	an obj. concerning literature for 1st	an objective concerning literature for second grade
III. Writing	etc.	etc.

Thus, the instructional units and their objectives are matched to the District Standards through the content outline. The curriculum matrix can then be used as a tool from which answers to questions such as, "Does existing instruction meet District Standards?" Of course much of the instruction will meet district standards. However when we first used the curriculum matrix we did find "gaps" in the curriculum. For example, we weren't spending enough time on writing, and there were too many units concerned with teaching students parts of speech. On the basis of this finding we could propose revisions to the curriculum, putting units in while taking them out as well. Because the original units were time based, that is, based on the amount of time it takes to complete a unit, we were relatively sure that we weren't overburdening a particular subject area or grade level with too much content, or too many objectives for a particular time period.

In a multi-school district, the subject area committee which proposed the District Standards would also need to wrestle with two options about applying the standards. The first option is to develop standard units across grade levels and subject areas. The second option involves developing a process for determining whether each teacher's or school's unit descriptions met the district standards. I have a bias for standard curriculum units across the district, as this develops a consensus about what should be taught, and the approximate amount of time devoted to teaching, as well as encouraging coordination across schools. The same staff who participated in generating the District Standards would be involved in modifying and aligning the curriculum.

At the end of this process, the district would have a description of instructional units which meet District Standards. Using the curriculum matrix, we were sure that our "lofty" proposals for an ideal curriculum in a subject matter were actually being implemented through units of instruction for children. Depending on time constraints and the expertise within the district, this process could be completed in two to four years.

Managing and Assessing Instructional Units Once units of instruction are aligned to District Standards, students must be assured the opportunity to master the curriculum units. Management systems gives the principal information about whether teachers have taught that unit and which students have mastered each unit in the curriculum. For example, in Red Bank, the principals, at the beginning of the year, ask each grade level to specify approximate dates when the unit tests will

be given. When a unit is completed, the teachers reports the results to the school office. Summary information is also given to the superintendent in the school's monthly report.

The principal then monitors student achievement on unit tests and uses this information to suggest improvement, with input from the teachers on the grade level. For example, when a large number of students in third grade did poorly on a unit dealing with subtraction, the principal and the grade level teachers analyzed the unit test results and reviewed the sequence of instruction. As a result, a teacher received released time to revise the unit. If teachers fall behind, the yearly schedule provides information for a conference with the teacher.

Teachers and principals also scrutinize standardized test results as another way to assess the effectiveness of instruction. In Red Bank, each year teachers and principals review the item analysis of the standardized tests to analyze which units of instruction need to be strengthened. Staff development programs then are directly tied to improving instruction and instructional units. For example, the standardized test results in reading disappointed the fourth grade teachers. Using the curriculum matrix, the teachers tallied the number of pages students read during the year. On the basis of this data they decided to increase the amount of reading required and revised units to include the longer reading selections. The next year reading scores improved.

The curriculum matrix provides the tool for managing a response to

the newest state mandate. For example, when the professional staff wanted to know how much writing was taking place at each grade level as the result of a state test in writing, they looked through the Reading/Language Arts curriculum and examined all of the units which were indexed under "Writing" in the curriculum matrix. We also examined the unit objectives in other subject areas, as writing projects also occurred there. This process provided the data for rethinking the quantity of writing assigned. The curriculum matrix, then, is a tool teachers and principals use to work toward better outcomes for students.

Updating and Refining Curricula Curricula need to be refined and updated regularly -- at least yearly -- so the curricula actually describes the instruction students receive. The curriculum committee which produced the District Standards should meet once a year to review the instructional units at each grade level at each school and check to see if the units are aligned with the District Standards. When a new mandate, such as Study Skills, comes from the State, then the curriculum committee has the tools to index how this skill is being taught and can make recommendations for deletion or addition of units. The curriculum committee also should recommend, on the basis of input from the principals, where district-wide needs exist so that appropriate coordination of staff development activities can take place for the following year. Such activities might involve planning a new instructional unit, implementing a new instructional strategy, or gathering data on an area of curriculum which needs to be improved. By following such a process, the curriculum becomes the yearly plan for the district and not a document which sits gathering dust on teachers'

desks or principals' bookcases.

Every five to ten years the committee needs to review and update the District Standards to insure that the standards are still congruent with recent research, with the best of instructional practice, and emerging conceptions of what is appropriate to teach in schools. For example, the advent of computers has introduced a new subject area into the curriculum. By reviewing the District Standards for each subject area, staff can make decisions about how this new technology should be used. Thus the district's curricula can evolve in an orderly and manageable way while assuring that the best of past practice is incorporated in present instruction.

Deducing the District's Philosophy of Education "Why didn't we do that in the beginning?" someone asked? We weren't smart enough; we didn't know what already existed in the curriculum; we didn't have a curriculum structure. A mystery is not solved without clues. To deduce the District's Philosophy, the subject area standards, summarized in the content outline, provide the clues to begin. If these major areas are put on small cards, then a district wide committee of people can reach a consensus on how the cards should be arranged and what the major headings should be. A district philosophy can then be written in much the same way that the district standards for subject areas were.

Once a district philosophy, reflective of actual instruction, is synthesized, then the committee needs to consider whether they have left out any critical areas, and whether the areas listed are receiving appropriate priority. Changes which result will have an effect on the

district standards and units in subject areas and grade levels. For example, in Red Bank, the recent advent of inexpensive computers may provided an impetus for reviewing and revising the district curricula about technology. We found that this subject was addressed in the Library (Using and retrieving information) Industrial Arts (Technical Literacy) and Social Studies (Decision Making). A committee reviewed and updated the content of units. A full revision of the the district philosophy should receive priority every five or ten years.

Summary The curriculum matrix is a curriculum development tool which helps align curriculum and instruction to district developed standards. In Red Bank, in a little over three years, we have developed curricula in all subject areas, preschool through grade eight using this general model. Such a curriculum development model addresses two variables which research has shown to promote student achievement: student success and content coverage (Squires, Huitt and Seagars, 1983, 1981). The curriculum matrix assures content coverage because the instruction is aligned with district standards and there is a management component for assuring that units are taught. Students success is monitored by the principals through teacher reports of students' mastery tests. In Red Bank, such a curriculum development system was implemented as student achievement over a four year period went from significantly below grade level to significantly above grade level for all subjects. For example, our eighth grade in 1979 scored 8.0 in Math and 7.3 in Reading on the Metropolitan Achievement Tests. In 1984 eighth grade students scored 12.2 in Math and 10.3 in Reading. We believe the structured curriculum development process, using the curriculum matrix, and staff development in instructional delivery

(described elsewhere, see Abrams, 1979, 1981; Spady, 1984) have had a great influence.

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APPENDIX

CONTENT OUTLINE FOR READING/LANGUAGE ARTS

I. Reading
- A. Word Recognition
  1. Context clues
  2. Phonic and structural analysis
  3. Use of the dictionary
- B. Vocabulary Development
  1. Word study in context
  2. Multiple meanings of words
  3. Figurative Language
  4. Use of the dictionary
  5. Applying new words in context
- C. Comprehension
  1. Literal
     a. understanding words in context
     b. recognizing the main idea
     c. identifying supporting details
     d. summarizing
  2. Inferential
     a. making generalizations
     b. drawing conclusions
     c. predicting outcomes
     d. realizing the author's purpose
  3. Critical Reading
     a. distinguishing between fact and opinion
     b. recognizing persuasive statements
     c. making judgments
     d. assessing the accuracy of information

II. Literature
- A. Types of Literature
  1. Myths and Fables
  2. Poetry
  3. Fiction
  4. Plays
  5. Nonfiction
  6. Novels
  7. Short Stories
  8. Essays
- B. Questions
  1. Questions of rhetoric
  2. Questions about meaning
  3. Questions of value

III. Writing
- A. The Writing Process
  1. Prewriting
  2. Outlining
  3. Writing down
  4. Editing
  5. Publishing

B. Writing Content and Form
1. Content
a. Short stories
b. Poems
c. Essays
d. Novels
e. Other Media
2. Form
a. Spelling
b. Usage and Mechanics
c. Handwriting

IV. Communication Skills
A. Speaking
1. Answering the Telephone
2. Taking Messages
3. Following Directions
4. Choral Reading
5. Public Speaking
6. Plays
B. Listening
1. Listening for Recall
2. Judging Spoken Information
3. Listening in Social Situations

V. Rhetoric, Logic and Thinking Skills
A. Types of Discourse (Language)
1. Descriptive
2. Narrative
3. Expositive
B. Levels of Discourse (Language)
1. Levels of Abstraction
2. Classification
3. Propaganda Techniques
4. Making Inferences and Judgements
5. Supporting opinions and ideas

VI. Media Production and Analysis
A. Types of Media
1. Television
2. Radio
3. Movies
4. Newspapers
5. Computers
B. Use of Media
1. Impact and types of messages
2. Strengths and weaknesses as a message carrier
3. Production Skills and Use of Technology
4. Social Issues
a. ethics
b. access
c. use and abuse
d. advertising and politics

VII. Study Skills
A. Locating Information
B. Organizing Information
C. Following Directions
D. Planning Study Time
E. Planning a Study Environment

Objectives Indexed by the CONTENT AREA

	1	2	3	4	5	6	7	8
I. Reading								
A. Word Recognition	1,2,3,4 19	1,2,3,4, 5, 10,13 25 VII *	1, 14	7, 15	8	2	3	
B. Vocabulary Development	5,16,17	10,13, 16,17, 24, VII	1,4, 14	7, 15	8	2	3, (19) **	(5,)8
C. Comprehension								
Literal	5, 6, 7, V	1,2,3,4, 6,7,9, 10, 16 V	9, 12	1,4, 6, 14	5, 9	3, 4	(2)3,4,6	1
Inferential	8, 10	12, V	5,7,9	3,8,11,13	6,7,9,12	4,5,6		2,3,4,5,6
Critical Reading	9	11	7,IV	IV	6, 11	7	5(6)8	
II Literature	3, 21, VI	26, VI	5, 12, 18, V	4, 5, 11, 14,19, V VI, 3	1, 6, 7, 15, II	7, 13, II	(6)7,9,10, 11, II,(5) 6	1,2,3,6,7, 9, 10, 4
III Writing								
A. The Writing Process		14,17,18 22	2,3,4,5,6, 10,11,12, 13,14,16	2,3,5,6,10 12, 17	1,2,3,4, 5,6,7,9, 10,11,12	4,6,7,8	(1)(2)(3)(4)(5), (7)(8)(10) 1,2 7,8,9	1(2)3(5)6(7) (9) 2,3,4,5,6 8, 9
B. Writing Content and Form								
1. Content		14, 15	3,4,6,10,11 12,13,16	2,3,5,6,10	1,5,6,9	4,6,7,8.	2,4,(7)(9) (10) 2,7,9	4,(5)(6),8 4,5,8.
2. Form								
a. Spelling	20	24	17	18	14	11	(11)	10
b. Usage and Mechanics	11,12,13	20,22,23	2,6,10,11, 12,15	2,9,12	2,3,4	8,12	3)4)	(4) (9)
c. Handwriting	14,15	27	19					

* Library Objectives are in Roman Numerals

** Language Arts Objectives are circled

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	1	2	3	4	5	6	7	8
IV Communication Skills A. Speaking	16. V*, VI	8 IX	5,8,15	10 , 5 13,16	13, 7	1	4, (5,) (6,)** (8)	7, (10)
B. Listening	16	8	8	10	13, III	1	(5, (6,	7
V Rhetoric, Logic and Thinking Skills	19	IV	3, 6, 7, 10	3	1, 6, 10, 11	4, 6, 7	2, (4,) (5) (6,) (7) 8 5	5, (6)
VI Media Production and Analysis A. Types of Media	II, VIII	VIII	16, X	17, VII, VIII	11, IV	6, II	(5) (8) III	II, IV, V
B. Use of Media	VIII	IX	16 XI	16	11		10, (3) (9) 8	
VII Study Skills	IV, 16	8, 21, II IV	I, II, III, VI, VII	7, 10, III	I V 8 13	1, 2 I	1, 2, (9) 12 I	(1) I

* Library Objectives are in Roman Numerals

** Language Arts Objectives are circled.

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Each objective summarizes a two week instructional unit.

Reading/Language Arts Objectives
Grade 1

Phonics

1.1 We will recognize and decode sounds in initial and final positions for pictures and words.

1.2 We will recognize and decode long and short vowels for pictures and words.

1.3 We will recognize and state pairs of words that rhyme.

1.4 We will recognize and decode words with blends.

Reading

1.5 We will read sentences and stories containing rebus symbols and develop a sight vocabulary.

1.6 We will recall details and identify the main idea of a sentence, paragraph and story.

1.7 We will put sentences and pictures in sequential order.

1.8 We will infer meaning from a paragraph or story using context clues.

1.9 We will give our opinion of an article or a story.

1.10 We will infer the main idea of a paragraph when the main idea is not stated directly in the paragraph.

Language Arts

1.11 We will identify nouns, pronouns, and verbs and select the correct forms in student composed sentences.

1.12 We will construct simple declarative and interrogative sentences using basic capitalization and punctuation rules.

1.13 We will use the table of contents to locate stories.

1.14 We will write clearly using upper case manuscript letters.

1.15 We will write clearly using lower case manuscript lettters.

1.16 We will follow simple oral directions using a given vocabulary.

1.17 We will match and write opposites in written and picture form.

1.18 We will arrange letters and words in alphabetical order.

1.19 We will classify words according to various groups.

1.20 We will read, spell, and use grade level words and appropriate content area words. We will be able to divide these words into syllables.

1.21 We will keep a list of books, articles and stories which we read on our own and share these with our classmates..